National Research Council goes into the junk business

Time, and the Canadian climate, have created havoc on once shiny, sleek cars now gathering dust in junkyards across the country.

Useless? Well, not quite. Indeed, a whole industry has been built around the profitable recycling of the large amounts of valuable materials that can be recovered from discarded automobiles. In the 1960s, heavy-duty shredders capable of processing an entire discarded automobile were developed to extract desirable scrap steel for the steel industry. The steel and iron were picked up by powerful magnets and recycled as feed for the steelmaking furnaces, while the non-magnetic portion of the metal – roughly 45 kg for the average car – was simply trucked to landfill sites and buried as garbage. No practical process existed in Canada to extract the zinc, copper, aluminum and stainless steel it still contained.

With the support of a National Research Council grant, Intermetco, a Halmilton, Ontario, metal recycling company, has developed a new process for recovering non-ferrous metals from obsolete automobiles.

Says metallurgist Satinder Vig: "Like butchers who claim to use everything in a pig but the squeal, companies like Intermetco in the metal recycling business are always looking for more ways to recover useful materials from junked automobiles. With the tremendous increase in the cost of energy and the growing scarcity of many non-renewable materials, this makes good business sense and it benefits the environment. Indeed, in the case of aluminum, the energy cost of recycled metal is one-thirtieth that of metal extracted from ore.

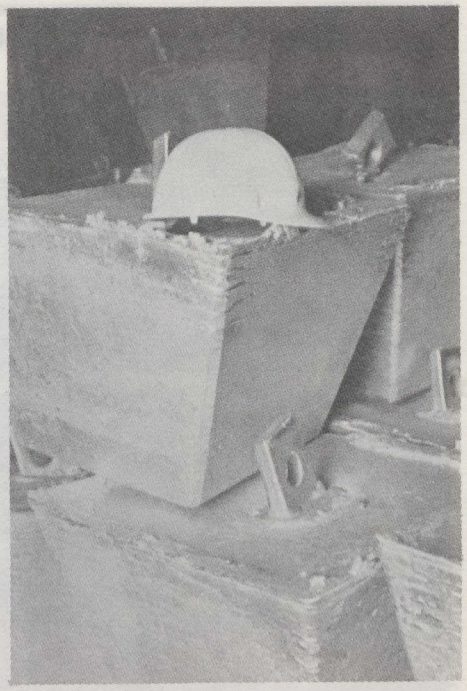
"Most of our laboratory experiments on the reclamation of non-ferrous metals were performed in our Hamilton, Ontario, laboratories. To many people, the word 'experiment' might conjure up images of tiny samples in test tubes, but one has to realize that scrap metal chemistry is performed on an entirely different scale of magnitude. An average sample of weight for an experiment is a ton of material, rather than a few grams, since the original material from a car is so heterogenous."

A thousand cars a day

"As things now stand," says Mr. Vig, "our pilot plant, [in Laprairie, Quebec], which has been in operation since September 1977, processes non-magnetic material generated by shredding up to 1,000 cars in an eight-hour shift every day. Every 45 seconds a whole car, with its engine block and everything but the gas tank (which might explode if left in place) is fed into our shredder. This machine is a hammer mill that chews the car up in a few seconds and breaks everything into small pieces. What comes out is a mixture of steel, various non-ferrous metals, plus diverse non-metallic debris such as glass, plastic, textile and rubber, sand, etc. The shredded material varies in size from fist-sized chunks to fingernail-sized fragments.

Photos by Michel Brochu

Powerful claws pick up a junked car and lift it to the mouth of a car shredder. On the right is the pneumatic sorter, which removes light debris from shredded car material.



Aluminum ingots await shipment to users. These valuable materials were previously discarded as landfill.

"The first processing step is an air separation system on the shredder itself. This is simply a strong blast of air that removes most light material, such as plastic and textile. Next, a series of strong magnets pick up the steel, which is the main target of our operation since it represents up to 80 per cent of a car's weight."

According to Mr. Vig, the company's new reclamation system begins at this stage. The starting material represents what is left when the steel is removed, the non-ferrous metals along with non-metallic junk. This is first pre-cleaned in a "rising current separator", a big tank with a controlled upwards flow of water that carries most light materials away while the metals and heavy solids sink to the bottom.

The plant not only husbands valuable, non-renewable resources, but contributes to the production of the environment as well, removing unsightly junk yards that mar the landscape.

(The preceding excerpts are from an article by Michel Brochu for Science Dimension, *1978/4.)*